REMARKS

Claims 1-16 are pending, with claims 14-16 having been withdrawn from consideration pursuant to a previous restriction requirement. Claim 13 is allowed.

Claim Rejections - 35 U.S.C. § 103:

Claim 1 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Sugawara et al. (U.S. Patent No. 5,527,581) in view of Bagrodia et al. (U.S. Patent No. 6,337,046).

Applicant respectfully traverses the rejection of claim 1 over Sugawara et al. in view of Bagrodia et al. Sugawara et al. discloses a car interior member and a method of molding the same. The interior member is a multi-layer construction made by a blow molding method. The interior member is characterized as a core member organizing a main structure in a certain area of a car interior and a functional member having every function and attached to the core member are integrated and formed by the blow molding method. The molding method of the car interior member is characterized in that the core member and the functional member are formed with more than two layers and are simultaneously molded with the multi-layer blow molding. Sugawara et al. involves a conventional multi-layer blow molding process to produce skin/foam/insert constructions for interior trim components. For example, an instrument panel holds a three layer structure which is made up of a base layer, a foamed layer, and a surface layer. These three layers are simultaneously formed by multi-layer blow molding. The base layer might contain conventional filler materials, such as inorganic filler (talc, mica, calcium carbonate, and others), glass fiber, or rubber.

The present invention provides a method for blow molding large parts by blow molding a single layer of a reinforced plastic melt comprising at least one thermoplastic material and reinforcement particles dispersed therein. The reinforcement particles are nanoparticles due to the magnitude of their dimensions. The use of nanoparticles obviates the use of the multi-layer approach as disclosed by Sugawara et al. In accordance with the present invention, a single layer containing the nanoparticles is blow molded. Thus, in accordance with the present invention, the blow molding process is a simpler, easier, and more economical process than the one disclosed by Sugawara et al. In the present invention, one material or layer containing reinforcing nanoparticles is blow molded into a part having a complex shape. When compared

to conventional large plastic parts, the resulting blow molded part in accordance with the invention has a higher modulus of elasticity and can thus be manufactured with a reduced wall thickness while maintaining the same required impact resistance.

The conventional larger filler particles as disclosed by Sugawara et al. act as stress concentrators and initiate tears in the parison. As a result, Sugawara et al. disclose a multi-layer blow molding process wherein the conventional filler material may only be added to the main structure.

In accordance with the present invention, parts can be produced that have 20-35% thinner wall sections that will have a comparable performance. The use of nanoparticles can provide the mechanical, thermal, and dimensional property enhancements, which are typically obtained by adding 20-50% by weight of glass fibers and/or mineral fillers to polymers. However, only a few percent of nanoparticles are required to obtain these property enhancements. Thus, many of the negative effects of high loadings of conventional reinforcement fillers are avoided or significantly reduced. c.f. specification as originally filed p. 13, line 20 to p. 14, line 2. These advantages include: lower specific gravity for a given level of performance, better surface appearance, toughness close to that of the unreinforced base polymer, and reduced anisotropy in the molded parts.

Bagrodia et al. discloses a process for producing containers for food and beverages from molded polyester compositions. An advantage of the disclosed process by Bagrodia et al. is the provision of containers with improved barrier and visual properties. Bagrodia et al. discovered that polyester-platelet particle composite bottles which exhibit high clarity can be formed by employing a blow molding process. Furthermore, they teach that polyester-platelet particle composites can be blow molded over a wider range of temperature as the result of an enhanced melt strength upon addition of platelet particles. However, Bagrodia et al. make no mention or understanding of the ability to significantly enhance the physical and/or mechanical properties of the base resin. Bagrodia et al. do not contemplate the possibility of providing large, structural parts through blow molding of a plastic material being reinforced with nanoparticles. The present invention discloses a blow molding method and apparatus for producing large, structural, reinforced plastic parts as opposed to relatively small containers for food and beverages as disclosed in Bagrodia et al. The use of nanoparticles in the plastic melt yields a part with a higher modulus of elasticity while maintaining the same required impact resistance. In accordance with an embodiment of the instant invention, the modulus of a conventional bumper can be increased by a factor of two to three times without significantly effecting the

impact resistance. In Bagrodia et al. reference, no reference to structural materials is contemplated.

In view of the remarks presented above, Applicant submits that Sugawara et al. in view of Bagrodia et al. does not render claim 1 obvious. Sugawara et al. discloses a conventional multi-layer blow molding process absent any nanoparticles. Bagrodia et al. are concerned with the improvement of visual and barrier properties of relatively small containers for food and beverages by adding platelet particles. However, Bagrodia et al. do not contemplate the provision of structural materials. Hence, it is submitted that the prior art cited does not provide some teaching, suggestion or incentive supporting the combination. Neither Sugawara et al. nor Bagrodia et al. suggest in some way a modification or combination with each other in order to arrive at the claimed invention. It is submitted that a combination of Sugawara et al. and Bagrodia et al. is improperly using applicant's teaching to hunt through the prior art for the claimed elements and combine them as claimed. Furthermore, a § 103 rejection based upon a modification of a reference that destroys the intent, purpose or function of the invention disclosed in the reference, is not proper and the prima facie case of obviousness cannot be properly made. For example, as discussed heretofore, Bagrodia et al. is strictly concerned with improving visual and barrier properties with no reference whatsoever to improving the mechanical properties of the final part. Thus, there would be no technological motivation for engaging in the modification or change. The instant invention provides a process for blow molding large, structural parts with novel properties as discussed above. These novel properties are unexpected from the prior art references.

Therefore, Applicant respectfully submits that claim 1 is allowable and withdrawal of the rejection is respectfully requested.

Claims 2-7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sugawara et al./Bagrodia et al. as applied to claim 1 and further in view of Noba et al. (JP 410244889).

Claims 2-7 ultimately depend from claim 1 and are likewise submitted to be allowable for at least the reason above. Withdrawal of the rejection is respectfully requested.

Claims 8-12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sugawara et al./Bagrodia et al. as applied to claim 1 and further in view of Petrelli (U.S. Patent No. 5,000,333) and Plant (U.S. Patent No. 5,649,587).

Claims 8-12 ultimately depend from claim 1 and are likewise submitted to be allowable for at least the reason above. Withdrawal of the rejection is respectfully requested.

Claim 1 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Sugawara et al. in view of Usuki et al. (U.S. Patent No. 4,889,885).

Applicant respectfully traverses the rejection of claim 1 over Sugawara et al. in view of Usuki et al. A detailed discussion of Sugawara et al. is provided above. Usuki et al. disclose a composite material composed of a resin other than polyamide resin and a layered silicate uniformly dispersed therein. The composite material is then molded by injection molding or heating pressure molding. However, Usuki et al. provide no disclosure of a blow molding process. Blow molding is a process of forming hollow products by expanding a hot plastic parison against the internal surfaces of a mold. This requires materials with a sufficient melt elasticity to form a parison without tears. Almost all of the resins disclosed by Usuki et al., e.g. vinyl based polymer compounds, thermosetting resins, or rubbers, are not suitable for blow molding. This is further evidence that Usuki et al. did not contemplate a blow molding process. Moreover, Usuki et al. teach that the layered silicate is uniformly dispersed in the resin. In other words, the layered silicate is exfoliated in the resin. This means that the silicate layers are dispersed into individual layers having a thickness of 0.7 to 1.2 nanometers. In an exfoliated structure, the layers of the silicate are completely separated and the individual layers are distributed throughout the polymeric matrix. This teaches away from the instant invention wherein it is taught that the exfoliation (delamination and dispersion) of the layered mineral particles into constituent layers does not need to be complete in order to achieve the objects of the present invention. The present invention contemplates that at least 50% of the particles should be less than about 20 nanometers in thickness and, thus, at least 50% of the particles should be less than about 20 platelets stacked upon one another in the thickness direction. In addition, at least 99% of the reinforcement particles should have a thickness of less than about 30 nanometers. This is taught in the specification as originally filed on page 8, lines 18-23, as well as in the claims of the instant application reciting that "at least 50% of the reinforcement particles having a thickness of less than about 20 nanometers, and at least 99% of the reinforcement particles having a thickness of less than about 30 nanometers". Conversely, Usuki et al. disclose a layered silicate uniformly dispersed in a resin. The layers of the silicate are 7 to 12 angstrom (0.7 to 1.2 nanometer) thick, i.e. they are about 1 layer or 1 nanometer thick, and are separated from each other by 3 nanometers and above (see Usuki et al. abstract,

claims, and col. 3, lines 26-31). Hence, Usuki et al. does not provide any motivation to provide reinforcing particles in which the exfoliation does not need to be complete. In fact, it may actually be viewed as teaching away from the instant invention.

In summary, Sugawara et al. disclose a multi-layer blow molding process whereas the instant invention provides a single layer blow molding method. Moreover, Sugawara et al. disclose that conventional fillers, such as conventional mineral fillers or glass fiber may be added to the main structure. There is no disclosure for the use of nanoparticles in Sugawara et al. In accordance with the instant invention, the use of nanoparticles as reinforcing particles obviates the multi-layer approach of Sugawara et al. Furthermore, Usuki et al. does not provide any disclosure of blow molding methods nor does it provide any motivation to employ reinforcing particles wherein the exfoliation of the layered mineral particles into constituent layers does need not be complete.

In view of the foregoing, it is submitted that the cited prior art does not provide any motivation to arrive at the claimed invention. Relying on Applicant's own teaching as justification for a combination of or modification to references is improper and is quintessentially hindsight based.

In view of this, Applicant submits that claim 1 is allowable and withdrawal of the rejection is respectfully requested.

Claims 2-7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sugawara et al./Usuki et al. as applied to claim 1 and further in view of Noba et al.

Claims 2-7 ultimately depend from claim 1 and are likewise submitted to be allowable for at least the reason above. Withdrawal of the rejection is respectfully requested.

Claims 8-12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Sugawara et al./Usuki et al. as applied to claim 1 and further in view of Petrelli and Plant.

Claims 8-12 ultimately depend from claim 1 and are likewise submitted to be allowable for at least the reason above. Withdrawal of the rejection is respectfully requested.

Applicant submits that the Application is in condition for Allowance, and a holding to this effect is respectfully solicited. If however, the Examiner believes that any issue remains, he is requested to call Applicant's undersigned attorney of record so that a brief interview may be arranged for resolving any such remaining issue.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,
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